

REPORT OF A CASE OF ACTINOMYCOSIS  
HOMINIS OF THE LUNGS.

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THE subject of this report was a married woman, twenty-five years of age, who was sent to Louisville on November 5, 1899, from one of the smaller towns in the interior of Kentucky. She had been married two years; before that time she had always been fairly well, although of delicate build and small frame, her ordinary weight having been about 100 pounds. One healthy child was born ten months ago. She was in bed three weeks after confinement, and just about this time began to have pain in the region of the left shoulder-blade. This was quite severe, and was followed in a short time by cough and profuse expectoration. Then a swelling was noticed over the lower left aspect of thorax, and there was great pain in this region. The following history was furnished by the practitioner by whom she was sent to Louisville:

"She was first seen in March, 1899. A few weeks after the birth of her child she complained of pain in the left side just below the border of ribs. She was at that time noticeably anaemic. She had fever, cough at times with purulent expectoration, sometimes streaked with blood. At this time the right lung was believed to be free from disease, but there was some disturbance in the left lung. It was finally concluded that there was a collection of pus in the left side at the site of pain, and an incision was made over one of the lower ribs at the posterior lateral aspect of body, evacuating a quantity of pus. The rib was found roughened, and a curette was used to scrape the diseased bone. This was in May last. There has since remained a discharging sinus. Three or four weeks later another softened area became manifest; this was incised close to the first incision and curetted and practised.

"Soon after this there was a considerable discharge of the

same kind of material from the bowel, and this has troubled her off and on ever since. There seems to be some connection between the two, as the sinuses discontinued to discharge when there was flow through the bowel, and when the bowel was quiescent the discharge from the sinuses seemed to be increased. On account of the great pain complained of, she was given large doses of opium and morphine. The diagnosis of general tuberculosis was made. *There was only one drug that seemed to have any effect, and that was iodide of potassium;* this was discontinued, however, because it injured her stomach too much."

The patient was admitted to the infirmary of the Louisville Medical College, November 5, and the following notes were made:

She is extremely emaciated, very white, and presents the general appearance of a patient in the last stages of tuberculosis. The buccal cavity and tongue are coated with little white patches, aphthous in character, and the result apparently of lack of mouth hygiene. There are three sinuses on the left lateral aspect of the body over the lower ribs. Expansion of the right side of the thorax is markedly diminished. The right lower thorax is distinctly prominent, the swelling corresponding to the position of the liver and the lower portion of the right lung, and most prominent in the anterior axillary line. The skin over this swelling is slightly reddened, and over the seventh rib in the nipple line fluctuation is perceived over the space of about one and one-half by three-quarters of an inch. Discomfort and pain are complained of in the abdomen, but no tumefaction or nodulation can be felt. While expectoration is at times quite profuse, practically no abnormal sounds are to be heard on auscultation over either right or left lung; but on the right side, especially at the lower portion of the lung, the respiratory sound is suppressed. On squeezing some pus out of one of the sinuses above referred to, and scrutinizing it, it is observed to be mucoid in appearance, white with a slightly yellowish cast, and in it are innumerable granules, some as large as the head of a pin, others quite minute.

On account of the presence of these "sulphur granules" the provisional diagnosis of actinomycosis was made. Microscopic examination confirmed the diagnosis, the clubbed ends of the ray fungus being very plain without staining; afterwards Gram's method of staining demonstrated the actinomycotic threads. Ex-

amination of the sputum showed the presence of the "sulphur granules."

The extreme condition of the patient and the extensive nature of the process precluded the possibility of surgical interference; the administration of iodide of potash was therefore begun, together with constructives.

The patient has always lived in the country, and since her marriage, two years ago, on a farm of about one hundred acres; they had a small number of horses and about sixteen head of cattle. She has done her house-work, but has not milked the cows or otherwise come in contact with horses or cattle. She disclaims the habit of chewing pieces of straw, or grain of any kind. There is no appearance of infection about the mouth, jaws, or neck. From the history, it would seem probable that the infection was primarily of the left lung and occurred by aspiration along the bronchi.

*November 25.*—Since her arrival at the infirmary there has been a diarrhoea, from two to twelve stools in twenty-four hours. They are watery and contain undigested food, mucus, and small streaks of blood. A close examination has failed so far to demonstrate the presence of "sulphur granules" in them.

The nurse has noticed that since the patient has been at the infirmary she has kept both thighs flexed on the pelvis. On questioning the husband, he says before she became bedridden she was unable to stretch her legs out fully; that this inability was first noticed in the left limb three or four months ago, and some weeks later it became manifest in the right limb.

*November 26.*—The patient gradually sank and died to-day. Post-mortem examination was immediately made. On removing the sternum, the right lung is found adherent to the wall laterally along the lower half and posteriorly its whole length. The left lung is free on its lateral aspect, but adherent posteriorly and at the apex anteriorly. The pericardial sac is distended with clear serum. The heart is small and flabby. On passing a sponge over the diaphragm behind the left lung to remove the fluid present, there come away, as adhesions are broken up, some fibrino-gelatinous masses and strings, red in color. On breaking up the adhesions of the right lung, pus begins to exude from the parietal wall from the sinuses which connect with the external swelling which has already been described. The adhesions of both lungs pos-

teriorly are dense, and, as they are broken up, the hand is felt to slip into spaces filled with soft, broken-down tissue. On the right side the lung is adherent to the diaphragm. The abdominal cavity now being opened, the liver is found small, smooth, and without adhesions, uninvaded. The spleen is as yet uninvaded; but where adherent to the abdominal wall postero-laterally the process has just reached its capsule. The stomach, the kidneys, the bladder, the uterus, the ovaries and tubes appear normal and unaffected. There is no indication of involvement of the appendix and cæcal region, nor of the small and large intestine. The diaphragm is seen to be involved in the process on the left side posteriorly, and was torn through in the attempt to separate the lung from the diaphragm.

The disease process continues downward from the lungs and connects with the sinuses on the left lower posterior aspect of the thorax already mentioned. After removal of the thoracic viscera, the diaphragm, and the liver, the process is seen to involve the left side of the posterior aspect of the thoracic wall over an area of seven by three inches, beginning above at the eighth rib and extending down to the twelfth. The ribs and vertebrae are bared and roughened. Purulent material can be milked up from the sheath of the psoas muscle. Quite a mass occupies the area along the psoas muscle to the left of the spinal column, running down to the sacro-iliac synchondrosis and then following the sheath of the psoas muscle into the iliac fossa, the course of this extension being very like that of tubercular psoas abscess so frequently encountered. The second lumbar vertebra is eroded on the left side. A similar condition exists in the region of the psoas muscle on the right side, only not quite so extensive and not extending into the iliac fossa. The thoracic wall on the right side is involved over an area of four by two and one-half inches, from the fourth to the seventh rib, corresponding to the swelling noted over the lower portion of the right thorax.

Careful inspection of the intestine, which is removed and slit up its entire length, fails to disclose any lesion appearing to be actinomycotic in character. The mucous membrane of the rectum and colon is congested, and there are two small areas of ulceration through the mucous membrane down to the muscular layer in the cæcum just above the ileo-cæcal valve. One of these is about the size of a three-cent piece, and the other three-fourths of an inch

long by one-fourth of an inch wide. These ulcers have smooth edges.

Careful inspection of the mouth, jaws, and neck fails to disclose any lesion due to the actinomyces.

The heart and lungs were preserved by the Kaiserling process, and were sent to Professor Flexner, of the University of Pennsylvania, for examination. His pathological report is appended.

#### PATHOLOGICAL REPORT BY PROFESSOR FLEXNER.

The specimen consists of the heart and lungs. The heart is small, the pericardial surfaces are smooth. The mitral and tricuspid valves are normal.

*Left Lung.*—The upper lobe shows over the middle-anterior portion old adhesions. On the lower surface, next to the lower lobe, there are similar adhesions. The upper lobe is somewhat compressed, but on section it is generally air-containing. The lower lobe is more voluminous, excepting over the lower third. The pleura is quite smooth. This lobe is opaque, its color grayish, and it presents a semi-translucent aspect. On section, very little evidence of air can be obtained. The surface is singularly homogeneous and translucent. The consistence is markedly increased. Over the lower third of the lung the pleura is covered by old adhesions represented by tags of tissue, and by fresh fibrinous exudate. This exudate surrounds and demarcates two foci of consolidation of yellowish color, over which the pleura is more or less deficient. Here occur losses of substance corresponding with cup-shaped depressions. The larger defect occurs at the inferior-posterior border of the lung; it measures four centimetres in circumference, and extends backward to the attachment of the aorta. The neighboring lymph-glands which abut upon this focus are pigmented, but not otherwise altered. The smaller area occurs along the mid-inferior edge of the lung. It is about two centimetres in diameter. The section of both of these is quite similar, showing the involved lung tissue to be firm, and of a variegated yellow-gray appearance. In the larger there is considerable new formation of fibrous tissue, which has brought about contraction and the cup-shaped depression already mentioned. It is especially about the small area that the pleura is covered with fibrin, and small haemorrhages have taken place in

this membrane. An old fibrous adhesion with the diaphragm binds this portion of the lung to that structure.

*The Right Lung.*—The several lobes are indistinguishable upon the surface. The whole structure measures sixteen by seven centimetres. The anterior half is compressed, but is still air-containing. The lower third of the mid-posterior border of the lung is occupied by circular masses measuring six and one-half centimetres in diameter. The pleura over this area is thickened, partly by fibrinous tissue and partly by fresher fibrinous exudate. There is a central irregular area, partly depressed, over which the pleura is gone; and a defect has taken place, the tag-like appearance of which indicates adhesion to the thoracic wall. The surface of this area is variegated, reddish brown, gray, and yellow, and about the deficiency there is a rim-like elevation, and thickening of the pleura. Above this, extending to the apex of the lung, there is a line of coagulated blood, faintly adherent to the pleura; whereas, posteriorly, involving the posterior half, and extending to the root of the lung, the pleura is covered by shaggy fibrinous membrane, two or three millimetres in thickness, which lies upon a dense fibrous layer of about equal thickness. A section carried along the median edge, through the solid mass described, reaching to the bronchi at the root of the lung, shows, imperfectly marked, the line of demarcation between the lobes. The upper portion of this section corresponds to the section along the anterior portion of the lung, whereas the lower portion takes in the lower lobe, in which the solid mass is situated. This lobe is firm, grayish-pink in color, and almost free from air. The solid mass itself is included in this thickened, solid lung, but is firmer than the surrounding tissue, and shows a yellowish-gray surface, which is much variegated. A section carried along the posterior border, within four centimetres of the root of the lung, shows the entire lung tissue, from apex to base, gray, semi-translucent, and almost free from air. Old adhesions, which exist between the posterior border and the surrounding tissues, including lymph-glands at the root of the lung, seem to be free from the peculiar, yellowish material composing the mass within the lung. On the other hand, on the left of the thoracic portion of the artery there is a firm mass of tissue measuring four centimetres in diameter, which on section shows a pinkish-gray variegation. It would appear as though it might represent an adhesion to the circular mass, at the inferior-

posterior edge of the lung which has been described. There is no invasion of the thoracic portion of the aorta.

#### HISTOLOGICAL DESCRIPTION (HEMATOXYLIN AND EOSIN, EOSIN AND GENTIAN VIOLET).

(1) *Specimen from Right Lobe in the Neighborhood of Larger Bronchi.*—The section includes a large bronchus and adjacent blood-vessels surrounded by lung tissue.

The main bronchus has intact epithelium. In the lumen there is a purulent exudate with desquamating bronchial epithelium. In the exudate are several actinomycotic *Drusen* (rosettes). These are immediately surrounded by pus-cells. They show characteristic felting of the filaments and the swollen, bulbous ends. At one end there is a somewhat more diffuse network of filaments, the swollen peripheries being absent. The lung tissue itself contains several small abscesses, in the centres of which many actinomycotic rosettes are contained. These are closely surrounded with pus-cells, the structure of the lung in this situation being lost. In their immediate periphery the lung tissue is the seat of an active proliferation of tissue cells and a moderate infiltration with leucocytes. At a somewhat farther distance the alveolar structure of the lung is more evident, although the framework is here also infiltrated with leucocytes and proliferated cells.

The smaller bronchi in this section contain pus-cells, which frequently quite close their lumen. The epithelium behaves variably: sometimes it is intact, and at other times it has partially or completely disappeared. In the neighborhood of the main bronchus and blood-vessels, there is a focus of the thickened lung tissue, in which irregular spaces lined with cubical epithelium exist. These areas resemble the so-called proliferated bronchial glands described by Friedlander. They are probably modified alveoli of the lung, the result of chronic fibroid induration.

This specimen, stained especially for the demonstration of the parasite, shows, besides typical *Drusen*, scattered and isolated filaments which lie especially in the diffuse exudation.

(2) *Section of the Sclerotic Portion, a little Distance removed from the Larger Bronchus and including the thickened Pleura.*—The portion corresponding with the thickened pleura consists of a fibroid tissue adjacent to the lung, to which is at-

tached the underlying voluntary intercostal muscle. In the thickened pleural tissues there are scattered masses of gold and yellow haematoïden pigment. The lung tissue proper shows much fibrous thickening with obscuration, or obliteration of the typical framework of the lung. In this thickened tissue there are abscesses, within which actinomyces rosettes are contained, surrounded immediately by pus-cells; while the more peripheral portion of the exudate contains proliferated tissue cells. The bronchi uniformly contain pus, and the smaller ones have lost, in part, their epithelial covering, from which denuded areas the surrounding tissue is being invaded with pus-cells.

(3) *Section of the Upper Lobe*.—It is free from focal lesion. The lung tissue is condensed. The alveoli are compressed, and in parts of the lung proliferation has taken place in their walls, with the production of fibroid tissue. In certain alveoli, which have escaped this thickening, there are fibrin, pus-cells, and desquamated epithelium cells. The bronchi generally contain pus-cells. The epithelium is in places absent, the surrounding lung tissue becoming invaded with leucocytes from this source. There are no large masses of the parasite in this section, nor, upon close examination, are there separated filaments, such as were present in the tissue near the bronchus, nor other pyogenic micro-organisms, discoverable.

(4) *Fibrous Mass beside the Aorta on the Left Side*.—This mass consists of dense, fibrous tissue, containing masses of small round cells and of leucocytes in which are circumscribed accumulations of leucocytes forming small abscesses, in the interior of which the actinomyces bodies occur. That this mass was originally connected with the lung is shown by the persistence of epithelial structures resembling alveoli with cubical epithelium.

The microscopical examination confirms the diagnosis, and is of interest in showing several pathological conditions due to the streptothrix actinomyces.

First.—Where the typical rosettes occur the lung tissue is infiltrated with pus. Frequently this accumulation becomes so thick that the framework of the lung becomes indistinguishable, and, moreover, may actually break down and produce abscesses. The rosettes occur in the substance of the lung and in the bronchi, whence they appear in the sputa.

Second.—In the more diffusely infiltrated lung tissue the

rosettes, or *Drusen*, are absent, and single threads, or fragments of threads only, can be made out. These are irregularly scattered and are free from bulbous ends. Here, too, the lung tissue shows no sign of breaking down, but only diffuse cellular infiltration.

Third.—In the immediate neighborhood of the *Drusen* there is very little or no tendency to the formation of new tissue; the process is chiefly suppurative. At a distance from these and in the neighborhood of the separated filaments, or, indeed, where no filaments can be made out certainly, in addition to the moderate cellular infiltration there is also new formation of fibrous tissue thickening and obliterating the alveoli and causing changes (cubical growth) in the epithelium.

Fourth.—Besides cells, fibrin also is present in certain alveoli and upon the pleura; search for other organisms—pyogenic cocci—was negative.

. We must conclude, therefore, that the actinomycetes organism is capable of causing (a) suppuration; (b) diffuse cellular infiltration and fibrinous exudation; (c) fibrous-tissue formation.

Fifth.—The invasion of the bronchi has caused purulent bronchitis. In the smaller bronchi the epithelial lining has been denuded, and an invasion of the walls with pus-cells, which finally find their way into the parenchyma of the lung, is taking place. It is therefore quite possible that the pneumonia is always bronchial and secondary to invasion by the parasites from the bronchi.

In view of the exhaustive review of actinomycosis, especially in America, which has recently appeared in the *ANNALS OF SURGERY* from the pen of John Rührah, M.D., of Baltimore, it is deemed expedient here to do no more than plainly report the above case.